

REMARKS/ARGUMENTS

Reconsideration of the application as amended is respectfully requested.

Status of Claims

Claims 1, 3, 4, 6, 8 and 15-19 are now pending in the application, with claims 1 and 16 being the only independent claims. Claim 1 has been amended. Claim 7 has been canceled, without prejudice. Claims 16-19 have been added.

Support for claims 16-19 can be found in paragraphs [0148] and [0149] of the published specification.

Overview of the Office Action

Claims 1, 3, 4, 6, 8 and 15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,193,345 (*Feinn*) in view of U.S. Patent No. 6,534,128 (*Carlson*).

Summary of Subject Matter Disclosed in the Specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

The specification discloses an ink jet printer, an image recording method, an active energy ray curable ink for the ink jet printer and a recording head, wherein a high quality image is formed by jetting ink in appropriately-small liquid quantities without unevenly concentrating the jetted ink and without lowering the quality of printed characters due to clogging of the nozzle openings of the recording head (*see* paragraph [0010] of the published specification).

The jetting opening of each nozzle, from which the ink is jetted, has a diameter equal to or more than 12 μm and not more than 22 μm (*see* paragraphs [0016], [0090] and [0091] of the published specification), and the ink substantially includes no volatile component (*see* paragraph [0102] of the published specification).

The volume of a drop of ink jetted from the nozzle is not less than 1 pico-liter and not more than 6 pico-liter. As a result, the diameter of a dot formed by jetted ink on a recording medium can be minimized to be in the range of 50 to 200 μm , and a high definition image can be printed at proper ink concentrations (*see* paragraphs [0018], [0019], [0142] and [0143] of the published specification).

The viscosity of the ink is not less than 20 mPa·s and not more than 200 mPa·s at 25 °C, and the viscosity of the ink is not less than 8 mPa·s and not more than 30 mPa·s when the ink is jetted from the nozzles. As a result, after receiving the jetted ink on the recording medium, the ink can stick to the recording medium and can be appropriately cured on the recording medium by an active energy ray radiating member which includes a first radiation source and a second radiation source. Consequently, a high quality image can be formed, while the shape of each ink dot formed by the jetted ink on the recording medium can be easily controlled, and the image formed on the recording medium can be greatly enhanced. In addition, because viscosity of the ink is equal to or more than 8 mPa·s and not more than 30 mPa·s when the ink is jetted, clogging of the jetting openings can be prevented, and the ink can be smoothly jetted. As a result, it is possible to form a high quality image at a high level of efficiency (*see* paragraphs [0031] to [0034], [0103], [0104], [0148] and [0149] of the published specification).

Argument

Independent Claim 1

Claim 1 has been amended to include the subject matter of now canceled claim 7 and the limitation of "an active energy ray curable ink."

Applicant respectfully submits that amended claim 1 is patentable over *Feinn* in view of *Carlson*.

Feinn does not disclose an ink jet printer comprising:

a recording head on which a plurality of nozzles for jetting an active energy ray curable ink are arranged;

a feeding member for feeding a recording medium; and

an active energy ray radiating member which radiates active energy ray;

wherein an image is recorded by jetting the ink from the nozzles of the recording head to the recording medium fed by the feeding member and by radiating the active energy ray by the active energy ray radiating member to the ink which sticks to the recording medium.

That is, *Feinn* relates to a water based ink jet printer which is commonly used, and does not relate to an active energy ray curing type of ink jet printer. Therefore, there is no disclosure relating to the features of "the ink substantially includes no volatile component" and "the active energy ray is radiated so as to have each dot diameter formed on the recording medium from 50 to 200 μm ," as recited in amended claim 1.

In *Carlson*, the composition of radiation curable ink is disclosed. However, *Carlson* does not disclose at least the following features of amended claim 1:

a jetting opening of each nozzle, from which the ink is jetted, has a diameter of not less than 12 μm and not more than 22 μm ;

a volume of a drop of the ink jetted from each nozzle is not less than 1 pico-liter and not more than 6 pico-liter;

a viscosity of the ink is not less than 20 mPa·s and not more than 200 mPa·s at 25°C, and the viscosity of the ink is not less than 8 mPa·s and not more than 30 mPa·s when the ink is jetted from a nozzle of the ink jet printer, and the ink substantially includes no volatile component; and

the active energy ray radiating member radiates the active energy ray in order to have each dot diameter formed on the recording medium to be from 50 to 200 μm .

That is, *Carlson* does not disclose the physical characteristics of the ink, the structure of the recording head, the ink jetting volume, and the radiation of the active energy ray to control the dot diameter, all of which are recited in claim 1.

As described above, *Feinn* does not disclose inclusion of an active energy ray curable ink in an arrangement such as that of the present claimed invention in which it is a key feature. Therefore, *Feinn* is completely different from the present claimed invention. Further, although *Carlson* discloses an active energy ray curable ink, *Carlson* does not disclose the physical characteristics of the ink, the structure of the recording head, the ink jetting volume, and the radiation of the active energy ray to control the dot diameter. Thus, it cannot be said that *Carlson* obviates the present claimed invention.

Moreover, although both *Feinn* and *Carlson* are in the field of ink jet printers, *Feinn* relates to a water based ink jet printer and *Carlson* relates to an active energy ray curable ink. In *Feinn* and *Carlson*, the composition of the ink and the image recording process are completely different from each other. The two references are incompatible with each other, so that combining them would not occur to a person with ordinary skill in the art. Rather, such a combination can only be due to impermissible hindsight based on the present claimed invention.

Therefore, the present claimed invention is not obvious over *Feinn* in view of *Carlson* under 35 USC 103.

The features recited in amended claim 1, such as the physical characteristics of the ink, the structure of the recording head, the ink jetting volume, and the radiation of the active energy ray to control the dot diameter cannot be derived even from a combination of *Feinn* and *Carlson*. Thus, the effects due to such features cannot be obtained. Therefore, it is respectfully submitted that amended claim 1 is patentable over *Feinn* in view of *Carlson*.

In view of the foregoing, withdrawal of the 35 U.S.C. §103(a) rejection of claim 1 is respectfully requested.

Independent Claim 16

Claim 16 is allowable for reasons discussed above in connection with amended claim 1.

In addition, it is noted that neither *Feinn* nor *Carlson* teaches or suggests the limitations of “wherein the active energy ray radiating member comprises a first radiation source and a second radiation source and radiates the active energy ray so as to have each dot diameter formed on the recording medium from 50 to 200 μm ” (emphasis added), as expressly recited in claim 16.

On page 4 of the Office Action, the Examiner acknowledges that *Feinn* does not disclose an active energy ray radiating member. It logically follows that *Feinn* does not teach or suggest “[an] active energy ray radiating member [which] comprises a first radiation source and a second radiation source and radiates the active energy ray so as to have each dot diameter formed on the recording medium from 50 to 200 μm ,” as recited in claim 16.

On page 5 of the Office Action, the Examiner contends that although *Carlson* does not explicitly disclose an active energy ray radiating member, one would necessarily be present in order to cure the ink composition. However, *Carlson* certainly does not disclose, either

expressly or inherently, “[an] active energy ray radiating member [which] comprises a first radiation source and a second radiation source and radiates the active energy ray so as to have each dot diameter formed on the recording medium from 50 to 200 μm ,” as recited in claim 16. If the Examiner has a contrary view, he is respectfully requested to point out exactly where in *Carlson* support for such a view exists.

Using an active energy ray radiating member comprising a first radiation source and a second radiation source is more than a design choice because such a radiating member improves the image quality. See paragraphs [0148] and [0149] of the published specification.

In view of the foregoing, applicant respectfully submits that claim 16 is also allowable based on the above-quoted limitations recited therein.

Dependent Claims 3, 4, 6, 8, 15 and 17-19

Claims 3, 4, 6, 8, 15 and 17-19 depend, either directly or indirectly, from independent claim 1 or 16 and, thus, each is allowable therewith.

In addition, these claims include features which serve to even more clearly distinguish the claimed invention over the prior art of record.

Conclusion

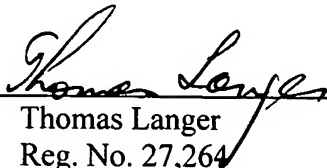
Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE LLP

By 
Thomas Langer
Reg. No. 27,264
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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